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ABSTRACT

This report describes a study of the role of reading in the Navy enlisted environment. The Navy Job Reading Task Interview was administered to 178 personnel (68 students, 32 instructors, and 78 job performers). Results provided information on the nature and extent of reading in the Navy, the reading skills of Navy personnel, and their attitudes regarding the Navy's current job training and reading-training programs. (Author)

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This report describes a study of the role of reading in the Navy enlisted environment. The Navy Job Reading Task Interview was administered to 178 personnel (68 students, 32 instructors, and 78 job performers). Results provided information on the nature and extent of reading in the Navy, the reading skills of Navy personnel, and their attitudes regarding the Navy's current job training and reading training programs.

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FOREWORD

This research and development was conducted in support of Exploratory Development Task Area ZF522.011 (The Assessment and Enhancement of Prerequisite Skills).

This report, the first of a series of two, provides information on the role of reading skills within the context of the Navy's occupational and career development systems. The other (NPRDC TR 77-41) (Sticht, Fox, Hauke, & Zapf, 1977) presents a general approach to the design, development, and implementation of a training system that incorporates both job skills and learning/communication skills improvement within an integrated framework.

The results of this study are intended for use by the Chief of Naval Education and Training. Dr. Thomas M. Duffy acted as contract monitor.

J. J. CLARKIN
Commanding Officer

SUMMARY

Problem

In the past, training research and development efforts have been directed at adapting the training system to individual differences in cognitive and affective processes. Recently, R&D efforts have been initiated for providing training to help the learner become a more adaptive person by improving his basic learning/communication skills within the context of an adaptive training program. One such skill is reading; that is, using written language in performing job tasks.

Purpose

The purpose of this effort was to provide information about the nature and extent of reading in the Navy, the reading skills of Navy personnel, and their attitudes regarding the Navy's current job training and reading training programs.

Approach

A structured Navy Job Reading Task Interview was administered to a sample of enlisted personnel comprised of students, instructors, and job performers. The interview consisted of three sections. The first section was designed to obtain sample demographic data and data on general reading and writing activities that occurred during the normal course of events; and the second, to elicit specific job reading task data; that is, reading that is required to complete a job task. The third section was concerned with personnel attitudes toward the Navy training system, reading problems, and reading training.

Results

1. Overall, personnel spend about 2 hours per day in general reading activities and slightly over 1 hour per day in general writing. Ninety percent of all personnel report reading signs, schedules, notices, manuals, forms, and figures; and 90 percent, filling out forms.

2. A total of 325 specific job reading tasks was identified by interviewees. Of these, 60 percent were reading-to-do tasks (e.g., look up a reference and complete the job task) and 40 percent, reading-to-learn (e.g., studying for a test). As interviewee moved further away from the role of student, he found it harder to cite reading-to-learn tasks. Sixty-two percent of all tasks cited involved use of figures.

3. Interviewees reported that they had performed 59 percent of the specific job reading tasks before and 41 percent, for the first time. For 45 percent of the tasks, the materials had been read before. For 50 percent, additional reading related to the task had been performed.

4. Twenty-nine percent of subjects reported that making a reading error would affect only themselves; 57 percent, that it would affect the Navy; and 7 percent, that it was of no consequence.

5. Forty-seven percent of the reading-to-learn tasks had been performed either to prepare for a test or because they were required. About 80 percent of instructors' responses were that they read to teach the material.

6. Subjects reported that, for 76 percent of the reading-to-do tasks, they would have to reread the materials if required to perform the same job the next day. Further, this percentage increased as the amount of elapsed time increased. Close to 70 percent of all learning that occurred in connection with reading-to-do tasks was incidental (i.e., just by reading and doing the job).

7. For 77 percent of the reading-to-learn tasks, learning had occurred intentionally (i.e., by using special study techniques); and for 23 percent, incidentally. The reread/rehearse strategy was reported most frequently, followed by the problem solve/questions strategy.

8. Both instructors and job performers indicated that daily job experience/on-job training was the most important training experience in regard to their Navy career.

9. Overall, instructors and job performers reported that 50 to 55 percent of the information taught in Navy school courses was relevant to job performance; and 70 to 75 percent, to passing the test. For correspondence courses, these percentages were 50 percent and from 70 to 80 percent respectively. Suggestions for changes to both courses indicated a desire to have written materials modified to make them simpler in language and format.

10. Subjects indicated that reading problems were experienced by 20 percent of students in both Class A schools and rate training courses and 15 percent of persons both in recruit training and performing on the job. At least one fourth indicated that they, themselves, had "some" difficulty in understanding the materials used in each of these four career activities.

11. Low personnel skills were cited by 52 percent of the personnel as the cause of reading problems; and a combination of low skills and difficult material, by 39 percent. Seventy-four percent of people-related problems cited were attributed to poor preparation and lack of motivation.

12. Sixty-four percent of subjects indicated that a job-related reading program would be helpful; and 31 percent, that it would not (mostly because they didn't need it). A strong relationship was shown between a person's GCT score and his perception of the usefulness of a job-related reading program.

13. Seventy-two percent of subjects indicated they would enroll in a job-related reading program if it were given during on-duty hours; and 43 percent, during off-duty hours.

14. Fourteen percent of subjects ranked their reading skills in the upper 20 percent of all enlisted personnel; 51 percent, above the 60th percentile; and 20 percent, at or below the 40th percentile.

Conclusions

The above results appear to demonstrate the feasibility of developing an integrated job skills/reading skills training system that will permit the marginally skilled person to have a more satisfying Navy career, while providing a more effective, competent Navy force.

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INTRODUCTION

Problem and Background

Many of the efforts conducted by the military services in training research and development (R&D) have centered on ways to adapt the training system to individual differences in cognitive (thinking) and affective (emotional) processes. For example, in self-paced instruction, the learning rate of an individual is accepted as a given and a person is allowed to proceed at that pace. Within certain limits, dictated primarily by administrative considerations, the slow learner is permitted to take as much time as he needs to complete a program.

More recently, military R&D agencies have begun to consider the development of training systems that, while adapting to individual differences in cognitive/affective processes, also begin to produce a more adaptive person; that is, one who can learn more effectively and efficiently in a wider range of content areas. For example, Dansereau, Actkinson, Long, and McDonald (1974), in an Air Force study, make the following point:

> Governmental agencies have been instrumental in stimulating research to provide a basis for educational improvements. In the main, these studies and subsequent attempts at implementation have been directed toward the improvement of teaching. That is, this research has been designed to ferret out ways of presenting information to students that will optimize their performance on a variety of criterion measures . . .
>
> The extensive efforts directed at improving teaching methods have overshadowed the few scattered attempts at developing a basis for improving students' learning strategies and skills. As we will argue, the relative neglect of the learning side of the educational coin is probably totally unwarranted and should be remedied as quickly as possible. Teaching and learning strategies need to be developed in concert, consequently, due to previous emphasis on methods, research on learning strategies needs to be brought "up to speed." (p. 5)

The Army has also recognized the need for improving the effectiveness of its training system by improving personnel learning capabilities. Project ABEL (Jealous, Bialek, Pitpit, & Gordon, 1975) was an "empirical exploration to determine the scope of the learning capacity of marginal Army personnel, to observe the longitudinal effects of long-term self-managed learning strategies, and to determine the proficiency levels that these men could reach as a result of these strategies." This work was an extension of earlier work (Weingarten, Jealous, Bialek, Boatman, Gordon, & Pitpit, 1973), in which the rationale for research to develop learning skills of Army personnel was discussed with regard to both generic (basic reading, oral communication, etc.) and generative (problem solving, information recoding, etc.) skills:

> Skills combine to form tasks, tasks in turn combine to form the higher order skill-composites involved in jobs and other social roles and statuses. Skills that are required in a wide variety of such higher-order composites may be said to be generic. The skills of arithmetic, reading, writing, and language use are "basic," not because they cannot be further reduced to more elementary levels, but because they are generic in this sense. An individual's mastery of generic skills increases decision-options, both his own and those of his social system in regard to role-allocation . . .
>
> Some skills are useful chiefly as a means of generating other skills. When a person "learns to learn," he masters a number of generative skills that can help him in mastering other substantive skills. Lacking a mastery of generative skills, a student remains, in a sense, a passive recipient of instruction, which must be very carefully tailored to his limitations. Generative skills, on the other hand, accord their possessor an active role in and ultimately the direction of his own learning . . . (p. 3)

In regard to the adaptive person training concept, the acquisition of both generic and generative skills would assist the student in building a broader skills base, and thus facilitate his becoming a more adaptive learner. The military R&D agencies recognize the importance of having a more adaptable job performer available for the more compact, technology-oriented military of the future. They also recognize the limitations of a training/job design policy that attempts to adapt to each individual's peculiar learning styles and capabilities. Such a policy would simply allow slow learners to continue to learn slowly and require manuals, regulations, and other printed materials to be rewritten to the level of the poorest reader. As a result, personnel of average or superior aptitude would not be further developed, as they are in programs provided for top management personnel in major industries, businesses, and government agencies.

Ideally, the development of job skills and adaptive skills for more efficient/effective learning and job performance would evolve together. That is, the job training system would adapt only partially to the learning/communications capabilities of the student; it would initially accommodate the individual and then operate to improve not only his job skills but also his learning/communications skills.

To illustrate, studies sponsored by the Army investigated the feasibility of integrated job skills and job reading training programs for Army personnel enrolled in the Supplyman (MOS 76A) course at Fort Ord, California (Hungerland & Taylor, 1975; Sticht, 1975a). This training program was modified (i.e., adapted to a self-paced format) to accommodate individual differences in learning. The reading materials, which were developed from Army clerical and supply materials, provided practice in using search strategies such as indexes and tables of contents, following procedural directions, using tables and graphs, and filling in job-related forms. It was hoped that

the modified course would produce a set of similarly skilled job performers and, at the same time, improve their basic learning/communications skills. Students completing the course were tested on a reading test designed to measure ability to read and to use Army technical materials in general (i.e., not exclusively Supplyman's materials). Results showed that students not only acquired the necessary job skills, but also improved from a mean reading grade level of 5.5 to 7.2, for a gain of 1.7 years (Sticht, 1975a). These results indicate that it is feasible to consider modifying job skills and learning/communications skills training systems to produce more adaptive training programs and more adaptive personnel.

The Navy Personnel Research and Development Center recently has initiated an R&D program (Duffy, Carter, Fletcher, & Aiken, 1975) to improve the adaptability of Navy personnel by improving their communication skills, which are considered as prerequisite or enabling skills underlying a wide range of Navy tasks. One such skill is reading; that is, using written language in performing job tasks. To complement its in-house R&D activities on reading, NAVPERSRANDCEN has contracted the Human Resources Research Organization (HumRRO) to conduct a two-phase study. In the first phase, which is documented in this report, information was provided on the role of reading skills within the context of the Navy's occupational and career development system. In the second phase, which is documented in Sticht, Fox, Hauke, and Zapf, 1977 (NPRDC TR 77-41), a general approach to the design, development, and implementation of a training system incorporating both job skills and learning/communications skills improvement within an integrated framework was developed.

Purpose

The purpose of this effort was to provide information about the nature and extent of reading in the Navy, the reading skills of Navy personnel, and their attitude regarding the Navy's current job training and reading training programs. This information was obtained through administration of a structured Navy Job Reading Task Interview to a sample of enlisted personnel comprised of instructors, students, and job performers.

APPROACH

Interview Sample

The sampling plan called for interviewing three types of Navy personnel at three specific career stages:

1. Students and instructors in the Recruit and Basic Training Programs.

2. Students and instructors in Class A schools.

3. Job performers on fleet duty aboard two classes of Navy ships.

Interviews were administered to personnel in ten A schools and two training programs at Navy training installations at San Diego, Great Lakes, and Meridian. Selection was based on the availability of personnel within a rating in rates E-1[1] through E-7 who were currently performing their normal rating duties at those installations. The ratings represented by the sample and the number in each are shown in Table 1.

Table 1

Final Sample Interviewed on Performance of Job Reading Tasks

Item	Personnel			
	Students	Instructors	Job Performers	Total
Recruit Training (RT) Program	8	4	0	12
Basic Electricity & Electronics (BE&E) Training Program	3	2	0	5
A School Rating/Training Program:				
Aviation Storekeeper (AK)	5	3	6	14
Aviation Structural Mechanic (AM)	0	0	4	4
Boatswain's Mate (BM)	8	4	10	22
Electrician's Mate (EM)	8	5	9	22
Electronics Technician (ET)	4	3	8	15
Gunner's Mate (GM)	5	3	8	16
Hull Maintenance Technician (HT)	8	4	7	19
Mess Management Steward (MS)	7	0	9	16
Personnelman (PN)	6	0	9	15
Quartermaster (QM)	6	4	8	18
Total	68	32	78	178

[1]Rates refer to enlisted military paygrade rank, with E-1 being the lowest enlisted rank in the career ladder.

Interview Instrument

A structured job reading task interview was administered in the interviewee's job area so as to have ready access to printed job materials and required about 40 to 80 minutes. It was designed to provide information about the nature and extent of reading (and, to a lesser degree, writing) in the Navy, the reading skills of Navy personnel, and their attitude regarding the Navy's current job training and reading training programs. The interview format was made up of three major sections. A discussion of the information obtained during each section and the rationale for requiring this information are presented in the following pages.

Section 1--Demographic Data and General Reading and Writing Data

Section 1 of the interview comprised 19 questions, the first 14 of which were designed to obtain interviewee demographic data. Items 15 and 16 asked respondents to indicate, on a checklist of reading materials (e.g., manuals, letters, signs, etc.), those that they used in the course of their current Navy activities and how much time they spent reading such materials. Items 17 and 18 were identical to the previous two, except that they referred to writing. The final question asked interviewees (1) how many hours they spent studying for their last rate training correspondence course and (2) over how long a time these hours were spread.

Section 2--Specific Job Reading Task Data

The second section of the interview was designed to elicit specific job reading task data, as opposed to general reading data. The interviewer asked the subject to consider specific job reading as an enabling subtask that helps him to accomplish a specific job task. For example, if a quartermaster needs to verify a computation of the times of sunrise and sunset (job task), he would have to refer to the Air Almanac for information about those times at a given latitude and date (enabling subtask), and verify the computation.

Figure 1 presents a general model for a specific job reading task. The specific job shown consists of a number of steps. With each step, there is an implicit question: Do I know how to do the next step? If the answer is yes, the person proceeds through that step to the next one. If no, he performs a subtask involving a general operation called "read," which acts on a data base called "material." Information is extracted by the "read/material" routine until the job task step can be performed, and the person proceeds through the task.

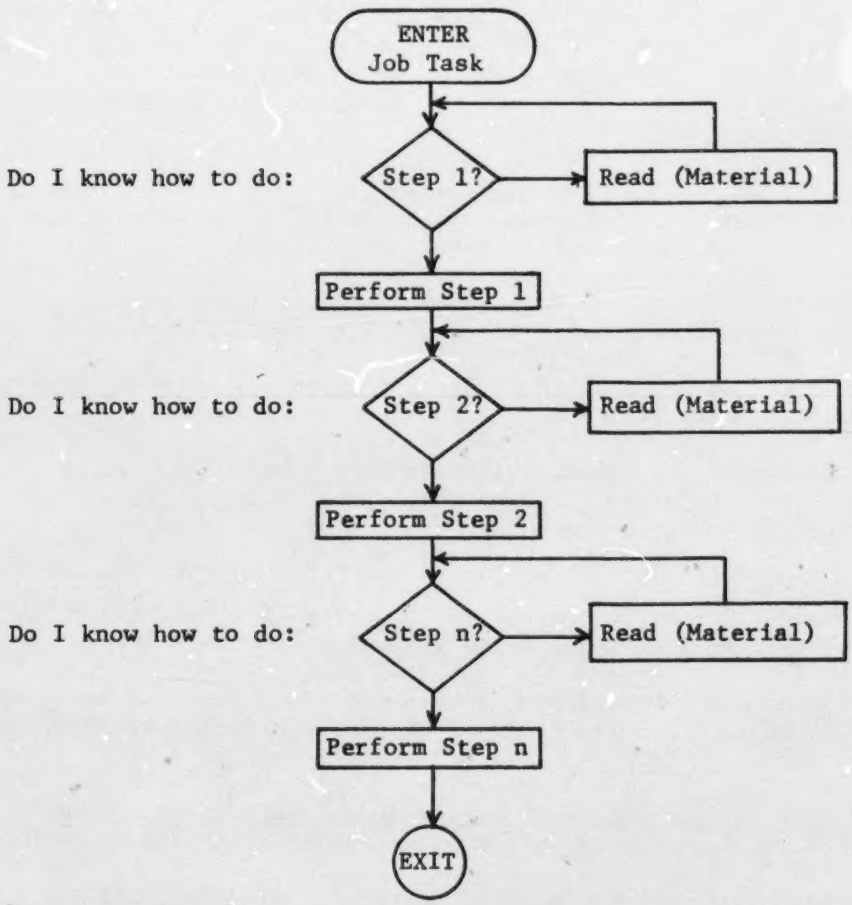

Figure 1. General model for specific job reading task.

Nature of Specific Job Reading Tasks. Two types of enabling subtasks--reading-to-do and reading-to-learn--have been identified on the basis of both the qualitative and quantitative differences in the amount of information processing required to perform the task. A reading-to-do subtask involves looking up or reading information for immediate use in completing a job task (e.g., checking a reference number); it is then applied to the job task and may be forgotten. A reading-to-learn subtask involves reading information that is to be retained for later use (e.g., in taking a rating advancement exam). When the interviewer felt that the subject understood the difference between the two types of reading subtasks, he asked the subject to name the job tasks he had performed the previous day (or the last working day) that had included reading subtasks. From the list of specific job reading tasks obtained, the interviewer selected two--one of each type, if possible.

Searching/Locating Strategies and Skills. For the two tasks selected, the interviewer asked the subject to obtain the printed materials used to accomplish them and to point out the exact section(s) read. If the subject had to get the materials from another room or work area, the interviewer accompanied him to assess the area. While the subject was locating the appropriate sections of material used, the interviewer noted the following:

1. The manner in which the subject located the material (i.e., Table of Contents (TOC), index, leafing through material, or other).

2. Whether or not a search strategy was applicable. For example, materials consisting of a single sheet would have no TOC or index. Also, in certain cases, it might be necessary to read an entire document to complete a job task.

3. The skill with which the search/locate task was performed, rated on a three-point scale of high, medium, or low (with a bias toward leniency).

4. How much of the information was obtained from text and how much, from figures. The interviewer then asked a number of detailed questions about the tasks.

Knowledge Contexts for Job Tasks and Job Reading Tasks. All job-related reading takes place within a context of work in which job tasks are routinely performed, some with a great deal of repetition. Additionally, specific reading tasks take place within a context of other, similar reading tasks. To fully understand the nature of reading in the Navy, it is necessary to understand the "contextual knowledge" that personnel may develop that may facilitate reading comprehension on the job. In this regard, it is important to know whether personnel read on a "one-time" basis or whether they read and reread the same materials to perform the same task. If they mostly perform repetitive reading tasks, this might imply that reading skills are less important. Repetitive reading, or reading concentrated on similar materials, may produce a very capable reader of a narrow range of topics. However, he may not be as competent as desired, particularly if the Navy's goal is to maintain a force of flexible and adaptable personnel who can readily and ably switch jobs and use their literary skills for self-instruction and guidance in performing a wide range of reading tasks.

To obtain this information, the interviewer asked the subjects the following questions (paraphrased from the interview format):

1. Have you done this particular job task before? If yes, how often and how long ago? If no, have you performed tasks that were similar to this specific task?

2. Have you ever read the specific printed material required to complete this specific job task before? If yes, when and for what purpose?

3. How much of the material accompanying the specific material required to complete the job task have you read and how often have you read it?

4. Have you ever read anything else that told you something about this specific job task? If yes, why and did it help you?

Expectancies for Value and Use of Information Gained. Information on expectancies for value and use of information gained is needed to provide a better understanding of the general cognitive/affective processes involved in the performance of work-related reading tasks. To determine the perceived value of reading, the interviewer asked the subject what would happen if he read the material incorrectly and thus made a mistake in doing the job task. Would the mistake only affect the subject himself or would there be some direct effect to the Navy system--in terms of time, material, etc.? Responses to this question should indicate whether or not people even perceive that a link exists between their reading behavior and some possible consequence for the job.

Information on estimates of perceived use was obtained by asking the following questions with respect to the reading-to-learn task (paraphrased from interview format):

1. Why did you select this information to study and learn?

2. How long do you have to remember the information learned until you use it?

3. How often do you expect to use the information learned?

To determine how much material people might have to search and sort through to put together the information they needed for the reading-to-learn tasks, subjects were asked whether the material they were looking for was (1) in one place in an order and arrangement suitable for study, (2) in one place but in a mixed-up order such that it had to be rearranged for study purposes, or (3) scattered throughout the material such that it had to be "dug" out and put together for study.

Storage and Retrieval Strategies. For reading-to-do tasks, information was needed to determine whether learning took place when the subject looked up material to complete a job task and, if so, whether this learning had been intentional, by using some strategy, or incidental, simply by reading and doing the job task. To obtain this information, the subject was asked the following questions:

1. Would you read this printed material again if you had to do this job again tomorrow . . . next week . . . next month . . . a year from now?

2. If yes (for tomorrow), will you need to look up all of the information you looked up this time or only part of it? If part, which information do you remember and how did you learn it?

3. If no (for tomorrow), did you learn all information needed just by reading the material and doing the job? If no again, what did you do to help you learn it?

For reading-to-learn tasks, subjects were asked whether they used any special study methods to learn the specific material and, if so, what they were. Also, they were presented with a checklist of nine study methods (e.g., take notes), and asked to indicate whether they used each of the methods "almost never," "occasionally," or "frequently."

Writing Component of Specific Job Reading Tasks. The final part of this section of the interview concerned the writing component of specific job reading tasks, as opposed to general reading tasks. Respondents were asked the following questions (paraphrased from the interview format):

1. Is there any writing connected with this job?

2. If yes, what kind (i.e., letter, memo, log entry, form, or other)?

3. When you finish the writing, does anyone check it? If yes, who?

Section 3--Literacy and Job Skills Training

The final section of the interview was designed to obtain information about the interviewee's attitudes toward and opinions of the Navy's career development system (i.e., formal school training programs, rate training correspondence courses), reading problems, and reading training.

Navy Training System. A principal objective of the Navy training system is to provide personnel with the information and skills necessary to perform the job. Such training is normally provided by (1) formal (resident) rating training, (2) self-study (nonresident) rate training correspondence courses, and (3) on-the-job training (OJT). Before efforts are undertaken to modify some or all of the training programs to include job-related reading, it is necessary to determine how Navy personnel feel about the relative value of these programs. To obtain this information, interviewees[2] were asked to rate the importance of (1) prerating knowledge, (2) school rating training courses, (3) self-study rating training courses, (4) daily job experience (OJT), and (5) off-duty education courses in terms of three aspects of their Navy career. These aspects were (1) performing current jobs, (2) passing the Navy-wide exam, and (3) performing future jobs (at higher ratings).

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[2]Instructors and job performers only; students were not included because of their limited Navy experience.

Navy School Training. The questions in this part were concerned with determining how the students feel about the training program itself. For example, do they feel that the learning load is too heavy to allow additional learning requirements or that some of the current requirements could be eliminated with no loss to their performance. To obtain such information, interviewees were asked to estimate how much of the information they are expected to learn in a school training program which is (1) needed to pass the course, (2) needed to be able to do the job, and (3) not needed for either condition (i.e., it may be nice to know but not necessary).

Another perspective to be considered is the recommendations for changes to the training school programs and their printed materials to make them more useful to the users. This information is very important not only during the actual modification of the current programs, but also as an indication of what experienced personnel feel is relevant for satisfactory job performance.

Currently, there is considerable concern over the reading difficulty level of the printed materials and spoken language used in Navy job training courses (Duffy et al., 1975; Curran, 1976). Recent Navy-sponsored studies by Carver (1973; 1974) and Biersner (1975) have shown that the average difficulty level of a sample of Navy rate training manuals is at or beyond the 13th grade level. In comparison, Duffy (1976) has estimated the average reading ability of Navy recruits at the 9.8 grade level. These data indicate a considerable discrepancy between the reading skill level of the personnel and the material they are expected to be able to read and comprehend. This difference is frequently referred to as the "literacy gap" (Duffy et al., 1975).

In the present study, to determine whether or not the "literacy gap" was perceived by Navy personnel, interviewees were asked to judge the difficulty of reading materials used in resident school training courses. Additionally, estimates were obtained for the difficulty of the spoken language used in Navy schools. Limited research (e.g., Sticht & Beck, 1976) has suggested that military personnel with low reading skills may also be low in the skills and knowledges required for comprehending spoken language. Thus, there was interest in determining the extent to which personnel perceived difficulty in comprehending the spoken language used in Navy schools.

Navy Rate Training Correspondence Courses. Similar information was obtained for rate training correspondence courses by asking the following questions (paraphrased):

1. How much of the information you are required to learn in rate training correspondence courses is actually needed to pass the course or to do your job? How much is not needed for either?

2. Are the rate training manuals easy to read and understand, and how can they be made more helpful to you?

3. How much of the information in these manuals do you try to learn?

Reading Problems/Reading Training. To determine the extent of reading problems in the Navy, interviewees asked the subjects to estimate the percentage of enlisted personnel whom they felt had difficulty in understanding (reading) the materials used in (1) recruit training, (2) Navy Class A school courses, (3) rate training courses, and (4) job performance. Another perspective on the extent of reading problems was sought by asking the subjects to rate how much difficulty (none, some, or a lot) they themselves had experienced in reading the materials used in these four career activities. To get an indication of the cause of reading problems, they were asked whether they felt the materials were too hard, personnel skills were too low, or both.

At present, it is possible for Navy personnel to pursue reading training through off-duty education courses. However, the participation rate--for both reading training or any other off-duty course--is very low. To discover the reason for this, interviewees were asked for their opinions on why more people did not participate in reading courses, either on duty or after duty hours. Given that many of the reasons given for not attending reading courses could be dealt with by various means, the question still remains as to whether or not Navy personnel feel there is a need for reading training and, if so, what incentives could be offered to encourage more people to participate. To obtain information related to this area, interviewees were asked the following questions (paraphrased from interview format):

1. Would a job-related reading training program (i.e., one that would help you better understand the materials you have to read) be of any help to you in your future Navy assignments? If no, why not?

2. Would you sign up for such a program offered during on-duty hours . . . off-duty hours? If no for either, what would it take to make you change your mind?

The final question in the interview instrument asked the interviewee to rate his reading ability against that of other enlisted personnel in the Navy.

RESULTS

Demographic Data

As indicated previously, the personnel sample administered the Navy Job Reading Task Interview comprised 68 students, 32 instructors, and 78 job performers. Demographic data for these personnel, which was obtained through section one of the interview, are summarized below.

The median age of the sample was 22 years, with a range from 17 to over 40. Students' median age was 19; job incumbents', 24; and instructors', 35.

Concerning ethnic background, caucasians comprised 81 percent of the sample; Blacks, 9 percent; Filipinos, 8 percent; and Spanish, 2 percent. Three percent (all students) were female.

Years of education completed ranged from less than 9 (8%) to more than 16 (1%), with a median of 12. Twenty-five percent did not finish high school, and 17 percent had attended college. Of the 75 percent having a high school certificate, 17 percent had the GED equivalent.

The median General Classification Test (GCT)[3] score was 56, with 96 percent of the scores falling between 35 and 79. Since the GCT has a mean of 50 and a standard deviation of 10, the present sample represents the full range of aptitude. According to Duffy (1976), a median GCT score of 56 corresponds, by regression analysis, to a general reading grade level of about 10.5 (i.e., the 5th month of the 10th grade); a GCT of 35; approximately grade 7.0; and a GCT of 79, above the 12th grade level. Thus, 96 percent of the reading scores for the sample fell between the 7th to 12th+ range. There were no major differences between instructors, students, and job performers on GCT reading levels.

The median time in the Navy was 4 months for students, 44 months for job performers, and 192 months (16 years) for instructors. The median time spent in present rating was 156 months (13 years) for instructors and 36 months for job performers.

Most instructors and job performers had received Class A school training in their ratings. However, those in the less technical ratings (e.g., Hull Maintenance Technician, Mess Management Steward) had had less training than those in the more technical or data-oriented ratings (e.g., Quartermaster)--50 percent vs. 60 to 70 percent. About a quarter of the personnel sampled had held civilian positions related to their Navy rating.

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[3]General Classification Test (GCT) is one of five subtests included in the Basic Battery Test, which is used to measure basic aptitudes of new Navy inductees. The GCT is designed to measure ability to think and to reason verbally.

Finally, the interview sample included comparable numbers of personnel in rates E-1 through E-7, with one E-8. Students were mostly E-1s and E-2s; instructors, concentrated in the E-6 and E-7 ratings, and job performers, fairly evenly distributed over the rates from E-3 to E-6, with a few at E-2 and E-7. Overall, the distribution of rates parallels the distribution with time in the Navy; i.e., the greater the length of service, the higher the rate achieved.

General Reading and Writing Data

General reading and writing task data refers to that occurring within the general Navy environment. Pertinent data for students, job performers, and instructors, which was obtained in the first section of the interview, are summarized below.

Students

Signs were the reading material most frequently cited by students (97%), and messages (e.g., telegraph messages), the least cited (6%). Notices and manuals were reportedly used by more than 90 percent of the students, while schedules, figures, forms, and directions were read by more than 80 percent. Correspondence courses, reports, letters, and messages were read by less than 25 percent.

Typically, students spent 2 hours a day in reading, with the range being from 0.2 to 6.0 hours. Lower ability readers (GCT $\leq$ 44) read 1.8 hours a day; and high ability readers (GCT = 65+), 3.0 hours.

Students in Recruit Training read 1.1 hours daily; those in Boatswain's Mate (BM) Apprenticeship School, 1.5 hours, and those in Class A schools, 2.0 hours. Three students in the Basic Electricity and Electronics (BE&E) Preparatory School reported reading 5 hours or more daily. This school makes heavy use of programmed texts.

To determine whether reading time varies as a function of the nature of ratings, the ratings were grouped into three job types:

1. Service/Maintenance, consisting of the Boatswain's Mate, Hull Maintenance Technician, and Mess Management Steward.

2. Technical Maintenance/Repair, consisting of Aviation Structural Mechanic, Basic Electronics and Electricity, Electrician's Mate, Electronic Technician, and Gunner's Mate.

3. Data Group, consisting of Aviation Storekeeper, Personnelman, and Quartermaster.

Recruit Training was maintained as a separate group.

Generally, students in Recruit Training read for 1.1 hours. Those in Service/Maintenance ratings read for 1.3 hours; Technical Maintenance/Repair ratings, 3.0 hours; and Data Group ratings, 3.8 hours. Thus, the amount of time spent reading differs for these four groups.

Concerning writing, 90 percent of the students reported filling out forms; 72 percent, writing classroom notes and assignments, and 58 percent, filling in logs. Thus, overall, fewer types of materials were written than were read.

Students spent about 2.25 hours a day in writing, with a range from 0 to 7 hours. Consistent with the reading data, the amount of time spent writing increased with the skill level of the training; that is, it ranged from 1/2-hour in Recruit Training to 2, 2.5, and 3 hours in the Service/Maintenance, Technical Maintenance/Repair, and Data rating groups respectively.

Job Performers

More than 90 percent of the job performers reported reading signs, schedules, notices, manuals, forms, and directions. Messages were the least read, as they were for students, although 50 percent of the performers read messages, compared to only 6 percent of the students. About 70 percent of the job performers reported reading correspondence courses, which reflects the Navy's use of such materials for rate and rating training.

Typically, job performers read 1.8 hours a day, with a range of 0.1 to 6.0 hours. As with students, lower aptitude readers read somewhat less (0.9--1.5 hours) than higher aptitude readers (2.0--2.3 hours). Again paralleling the data for students, job performers in the less skilled ratings (Service/Maintenance) read less (1 hour) than those in the more skilled ratings (Technical Maintenance/Repair) (2 hours), and Data-oriented ratings (3 hours). These data suggest that the reading demands of the job are being represented in the A schools, and reinforce the notion that different rating groups have different reading demands.

Job performers also showed differences in the amount of time spent reading as a function of rate, with E-1s to E-3s reading 0.7 hours daily; E-4s and E-5s, 1.7 hours; and E-6s and E-7s, 2.1 hours. This suggests that the higher up the ladder one moves, the greater the requirements for reading. This is consistent with Army research (Department of the Army, 1968), which indicates that people of higher rank spend a greater proportion of their reading time on job-related reading.

One reading activity that differentiates job performers from students is the reading of rate training correspondence courses. Promotions in the Navy are contingent upon the satisfactory completion of such courses. In the present sample, personnel were asked to estimate the amount of time spent in completing their last course. Job performers spent around 30 hours studying their last correspondence course, with study times ranging from less than 10 to more than 100 hours. On the average, this reading/study was performed at a rate of 4 hours per week, although some personnel reported spending more than 16 hours. Typically, job performers had completed their last rate training correspondence course about 18 months prior to the interview. However, almost a quarter had completed their last rate training course from 4 to 5 years or more prior to the interview. These people were at the higher rates (E-6--E-8) and had more than 5 years in their present rating. It is legitimate to question the accuracy of these estimates over such periods of time; however, the data reflects the fact that such courses are used to qualify personnel for promotion to higher rates, and it does present a description of the reading engendered by correspondence course advancement requirements.

Concerning writing activities, the most frequently cited types of writing were filling out forms (88%) and logs (69%). Fifty percent of the job performers reported writing schedules and memos and preparing figures. Writing typically occupied 1/2-hour a day, with a range from 0 to 6 hours. The least writing (0.5 hour) was performed by those in the Service/Maintenance and Technical Maintenance/Repair ratings; and the most, by those in the Data ratings (1 hour). Similarly, higher ranking personnel (E-6--E-7) wrote for 1 hour a day, while those in rates E-1 through E-5 wrote for 1/2-hour. These data are consistent with the reading data in suggesting greater use of literacy skills in the Data ratings and at the higher rates.

Instructors

All of the instructors interviewed reported reading signs, schedules, and forms, with over 90 percent reporting reading notices, manuals, directions, figures, memos, orders, correspondence courses, reports, and Navy regulations. Not surprisingly, more than half of the instructors reported reading instructor's guides, lesson plans, and other course-related materials. All together, more instructors reported reading more diverse types of materials than either students or job performers.

However, instructors spent no more time per day in reading (2 hours) than students or job performers. Interestingly, reversing the trend for students and job performers, instructors in the lower aptitude/reading skill range reported spending almost twice as much time in daily reading (3.0 hours) as those in the higher GCT/reading skill levels (1.7 hours). Also, instructors in Class A schools reported spending less time reading (1.8 hours) than those in Preparatory School (BE&E--3.0 hours), Apprenticeship School (3.5 hours), or Recruit Training (2.1 hours). However, as shown in Table 1, none of the instructors interviewed were in the Personnelman's rating, where data for students and job performers in this rating indicates a fairly high level of reading (2.5 and 3.0 hours respectively). Also, the number of instructors interviewed per rating/training area is very small, so these data cannot be considered as very reliable.

Consistent with the data for students and job performers, instructors in the three career cluster areas reported more time in reading as the skill level of the cluster area increased: Service/Maintenance--1.0 hour; Technical Maintenance/Repair--1.8 hours; and Data--2.2 hours.

Like job performers, instructors had spent time studying rate training correspondence courses and, in fact, reported typically spending 44 hours on such study (compared to 30 hours for job performers), with 8 hours a week being a typical rate of study. Half of the instructors reported that 21 months had elapsed since they had completed their last rate training correspondence course; and 38 percent, that they had not studied a rate training course in the last 5 years or longer. Again, the estimates of time spent studying must be regarded with caution.

Concerning writing activities, instructors reported spending about 1.4 hours a day in writing, with the most frequent type being filling out forms (97%). As in reading, more instructors reported a wider range of types of writing than did either students or job performers, with a majority (60%) reporting the development of course materials as a major writing activity. Instructors in the more skilled career areas spent twice as much time (2 hours) in writing than those in the least skilled (Service/Maintenance; Recruit Training) career areas (less than 1 hour).

Comparison of Reading Done by Navy and Civilian Personnel

Sharon (1972) conducted a national survey of a representative sample of adults (persons 16 years and over) to determine what types of materials they read. Those who indicated that they were part of the work force (40%) were asked what types of materials they read on the job. Table 2 lists several categories of reading materials itemized in Sharon's work that seem (at least in name) to correspond to materials asked about in this interview survey, and the percentages of civilian and Navy personnel who reported reading these materials. From this table, it appears that the Navy tasks involve more reading overall than those found in the civilian world of work. For example, 43 to 57 percent of the civilians reported reading "Signs/Schedules/Notices" on the job, as compared to 94 to 99 percent of Navy personnel. This is true also in terms of the median time spent reading, which was 2 hours in the Navy sample and 1 hour in Sharon's sample. Taken at face value, these data suggest that, generally, the literacy requirements of the Navy far exceed those of civilian jobs considered generally.

Specific Job Reading Tasks

Nature of Specific Job Reading Tasks

In the second section of the interview, interviewers asked the subjects (N = 178) to provide a list of all the job tasks they had performed the previous day (or the last working day) that included a reading task. As a result of this question, a listing of 325 job reading tasks was obtained--196 (60%) reading-to-do tasks and 129 (40%) reading-to-learn tasks. Figure 2 shows the percentages of both types of reading tasks cited by the three subsamples. Although the interviewer attempted to obtain a citation of one to-do and one to-learn task from each person, it became more and more difficult to identify reading-to-learn tasks as the subject moved further from the role of student. Job performers, in particular, simply could not provide the desired citation. Three fourths of the reading these people do is the type in which materials serve as aids or consultative devices. Thus, learning of the content is not required.

Searching/Locating Strategies and Skills

The results of the analysis of searching/locating strategies used by personnel in finding materials relating to selected job tasks showed that, for the most part, these strategies were not mutually exclusive. For example, if the reading material for some task permitted the use of the Table of Contents (TOC), index, and leafing, the interviewer might have rated the subjects on all three: (1) TOC--applicable, not used, (2) index--applicable, not used, and (3) leafing--applicable, used and with high skill level.

Table 2

Reading Materials Used by the General Civilian Work Population and the Navy Work Population

Reading Materials	Civilian Work Population (%)	Navy Work Population (%)
Signs/Schedules/Notices	43-57	94-99
Forms/Logs/Invoices/ Accounting Statements	39-44	72-91
Letters/Memos/Notes	48	47-78
Manuals--Written Instruction/ Directions	43	88-93
Legal Documents (Navy Regulations)[a]	14	68
Reports/Articles in Publications (Correspondence Courses)[a]	34	51

[a]Materials in parentheses are judged to be the Navy equivalent of the corresponding civilian materials.

In this regard, Table 3 shows that TOCs and indexes were used for only about 25 percent of the tasks for which they were applicable, as compared to 91 percent for the leafing-through strategy. In part, this reflects the repetitive nature of job reading discussed earlier, which permits people to know roughly where certain information is located in the materials they read.

The skill level ratings given to search strategies observed being used to locate the desired information were generally high. The overall percentages of high, medium, and low ratings assigned to the TOC strategy were 70, 19, and 11 respectively; the index strategy, 80, 10, and 10; and the leafing strategy, 76, 18, and 6.

Finally, interviewers noted that, of the 325 reading tasks identified, 104 (32%) involved reading textual materials only; 81 (25%), using figures only; and 120 (37%), reading and using both text and figures. Thus, 62 percent of the reading tasks involved the use of figures.

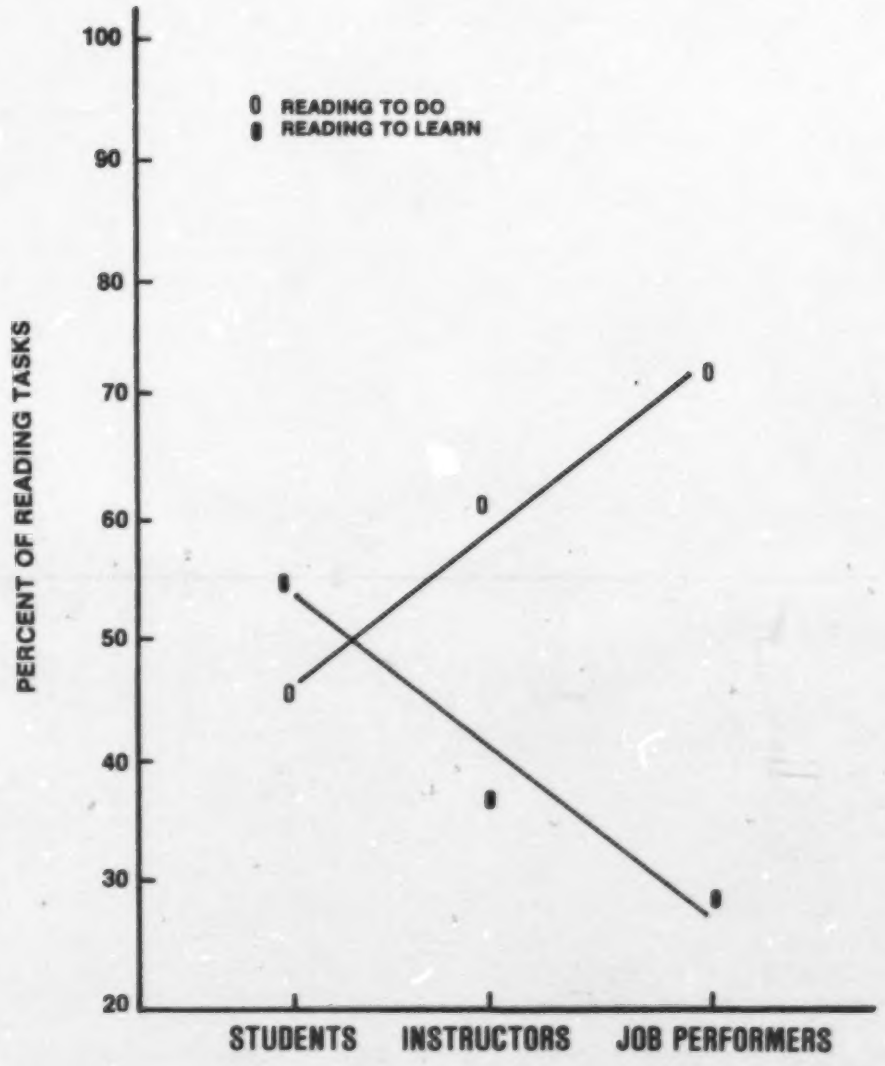

Figure 2. Percentage of reading-to-do and reading-to-learn tasks cited by Navy personnel.

Table 3

Applicability and Use of Search Strategies

Type of Search Strategy	No. of Tasks (N)	Applicable (%)	Used When Applicable (%)
Table of Contents			
Instructors	33	73	21
Students	76	72	24
Job Performers	59	92	33
Total	168	79	27
Index			
Instructors	32	50	12
Students	74	46	32
Job Performers	56	71	18
Total	162	56	22
Leafing Through Materials			
Instructors	32	--	88
Students	77	--	94
Job Performers	53	--	87
Total	162	--	91
Other[a]			
Instructors	4	--	--
Students	24	--	--
Job Performers	73	--	--
Total	101	--	--

[a]Of the 101 tasks for which the first three search strategies were not applicable, more than half (52) were tasks in which the entire printed source was used; and about one fourth (27), those requiring the use of unbound printed materials.

Knowledge Contexts for Job Tasks and Job Reading Tasks

Interviewees reported that they had previously performed 192 (59%) of the 325 job tasks identified; and 133 (41%), for the first time. For job performers, these percentages were 79 and 21 percent respectively, indicating a high degree of task repetition for workers on the job. For students, however, the trend was in the opposite direction. Only 33 percent of the tasks they reported had been performed previously; and 66 percent for the first time. This seems to be consistent with what we would expect for people just learning a job.

The frequency and recency data obtained for the 59 percent of the tasks reported as having been previously performed show that almost one-third of the reported tasks were being performed daily and that most of them had been repeated within the last month.

Finally, the data obtained indicates that overall, for more than two-thirds (68%) of the tasks reported as not having been done before, a similar task had been performed.

Information was also obtained on the knowledge context for job reading tasks. In this regard, results showed that, of the 325 reading tasks identified, the materials had been read before in 146 (45%) of the cases. For instructors, the overall percentage increased to 75 percent, while for students, it declined to 27 percent.

Data obtained regarding recency and purpose of prior reading were obtained for 60 percent (N = 87) and 100 percent (N = 146) respectively for the 146 reading tasks that had been performed previously. These data indicated that, for almost two-thirds of these tasks, the specific material had been read previously within the past month and that it had been read for the same purpose.

For 90 percent of the reported reading tasks, some portion of the remainder of the materials (i.e., not just the part specifically cited as the job reading task for the interview) also had been read. In fact, in 57 percent of the cases, more than 80 percent of the remainder had been read.

Estimates of the frequency with which the portions of the rest of the materials were read were available for 174 (54%) of the reading tasks. Of these, 36 percent had been performed only once before; and 75 percent, weekly or more frequently.

For 50 percent of the total reading tasks cited, additional reading related to the task had been performed, and in 67 percent of these cases, the related reading helped in reading the material cited in the reading task for the job interview. For instructors, these figures changed to 68 and 53 percent.

Expectancies for Value and Use of Information Gained

Table 4 presents responses to the question asking subjects what would happen if they read the materials incorrectly and thus made an error in completing the job task. As shown, a total of 443 responses was obtained (some subjects made multiple responses for a given task). Of these, 129 (29%) reported that the reading error would affect only themselves (e.g., verbal reprimand of some type); 253 (57%), that it would affect the Navy; and 31 (7%), that it was of no consequence. Thus, for the most part, Navy personnel see some value for their reading. Reading has a perceived functional value since there are perceived contingencies between the act of reading and the functioning of the Navy as an operational system.

Table 4

Consequence of Making Reading Error in Performing a Job Task

Consequence	Instructors %	(N)	Students %	(N)	Job Performers %	(N)	Total %	(N)
Affect individual only	13	(10)	32	(54)	33	(65)	29	(129)
Affect Navy System:								
Time (efficiency)	42	(32)	22	(38)	18	(35)	24	(105)
Time/Material	11	(8)	17	(29)	16	(31)	15	(68)
Equipment damage or loss	5	(4)	7	(12)	14	(27)	10	(43)
Personnel (bodily harm)	5	(4)	8	(14)	10	(19)	8	(37)
No consequence (i.e., nothing would happen)	8	(6)	6	(10)	8	(15)	7	(31)
Other	16	(12)	8	(14)	2	(4)	7	(30)
Total[a]	100	(76)	100	(171)	101	(196)	100	(443)

[a]Some of the interviewees made more than one response for a single job task.

As indicated previously, estimates of the expectancy for use of the information gained from reading were obtained with respect to the reading-to-learn tasks only. For 115 such tasks, 47 percent were reported to have been performed to prepare for a test or because it was required. This was primarily due to responses by students and job performers, many of whom must take correspondence courses and pass final course exams to get promoted. About 80 percent of the instructors' responses were that they read to teach the material. Thus, as perhaps is true in the civilian world, reading-to-learn tasks are motivated largely by system requirements for testing or certifying as qualified for advancement to some next stage of development.

Additional insight into the perceived uses of what was learned in reading-to-learn tasks was obtained by asking respondents when they first expected to use the learned information and how they expected to use it.

Responses indicated that more than half of the reading-to-learn tasks provided information that people thought would be used within 24 hours while 90 percent of task-derived information was expected to be used within 30 days.

Further, for 76 reading-to-learn tasks (approximately 60 percent of the total of 29 reported), over half resulted in information that personnel estimated they would be using daily, with 75 percent being used one or more times every month.

These data indicate that the reading-to-learn tasks were perceived as being performed for a definite purpose and that the information learned would be used relatively soon and repeatedly. Again, this establishes a perceived functional context for reading-to-learn, which may serve as a motivation for learning by reading.

Responses to the questions regarding the difficulty encountered in finding the specific material needed indicated that, for the most part (91% of the tasks), the materials were in one place and in the desired order.

Storage and Retrieval Strategies

Information on the strategies used by personnel for storing and retrieving what they read was obtained separately for reading-to-do and reading-to-learn tasks.

Reading-to-do Tasks. For 149 (76%) of the 196 reading-to-do tasks identified, respondents reported that they would have to read the materials again if they had to perform the same job task tomorrow. Further, this percentage increased as the amount of elapsed time increased (i.e., to 80, 83, and 85% for a week, a month, and a year, respectively). These results suggest that reading is an inherent part of a large number of tasks, such as filing a document, filling out a form, etc. It also suggests that rereading is required because people forget some of what they read, and thus have to reread it. This latter suggestion is supported by the fact that, of the 76 percent of tasks that would have to be reread "tomorrow," only 60 percent would have to be reread completely. Thus, in the remaining 40 percent, some learning had taken place. For that 40 percent, information was obtained on whether the learning was incidental or intentional. Responses showed that, overall, for 73 percent of the tasks, the learning occurred just by reading the job materials and doing the job task (i.e., incidental learning). For the remaining 27 percent, the respondents indicated that they had used some learning strategy (i.e., intentional learning).

For 45 (24%) of the reading-to-do tasks identified, respondents reported that they would not have to look up the material again "tomorrow" (implying that the relevant material had been learned). When asked how this learning occurred, they responded that it was incidental in 71 percent of the tasks and intentional in 24 percent.

Thus, in both cases where learning was indicated with reading-to-do tasks, incidental learning accounted for almost three-fourths of the results. Either most of the subjects could not recall any particular learning strategy used or the information processing involved in extracting information from texts and/or in applying it to complete a task provided sufficient cognitive transformation for learning to occur.

Reading-to-learn Tasks. Interviewees who had identified the 129 reading-to-learn tasks were asked whether they used any special study techniques to learn the specific material. Responses were received for 107 (83%) of the tasks. Of this total, subjects reported that, overall, learning had been accomplished by special techniques for 77 percent (N = 82) of these tasks and that it had occurred simply by reading the material for 23 percent (N = 25). For students, these percentages changed to approximately 90 and 10 percent, respectively.

For the 82 tasks involving special study techniques, responses were solicited regarding the nature of these techniques. Altogether, a total of 147 responses was obtained, with some tasks receiving multiple responses, 143 of which were classified into the following four storage/retrieval strategies:[4]

1. Reread/Rehearse (R/R): Involves repeating the processing of information taken from text, with minimal elaboration or transformation.

2. Problem Solve/Questions (P/Q): Involves answering text questions, solving problems in texts, and performing tasks that stimulate a search through materials to obtain specific answers.

3. Relate/Associate (R/A): Involves use of mnemonics, discussion of materials, association of new information with other information, and elaborations.

4. Focus Attention (F/A): Involves activities that reduce the amount of information in some manner; e.g., underlining key points, outlining, taking notes.

As shown in Table 5, which lists all the study techniques reported by the interviewees, the reread/rehearse (R/R) strategy was reported most frequently, accounting for 34 percent of the total responses. The focus attention (F/A) strategy was reported least frequently, accounting for only 13 percent. The relate/associate (R/A) category included the greatest number of different entries, although some of these may have just as logically been categorized as R/R.

To determine how often Navy personnel use various study methods, 144 subjects were presented with a checklist of nine specific study techniques that had been used in a previous study with Air Force personnel. These specific techniques were selected because there was some interest in comparing the two surveys. Table 6 lists these techniques, categorized under the four learning strategies listed above, and indicates how they were rated by 144 personnel. As shown, the "read material over" technique, within the R/R strategy, was rated as being used frequently by 60 percent of the personnel, followed by "underline important parts," within the F/A strategy, which was used by 57 percent. Neither of these two techniques requires much transformation of or elaboration on the material to relate it to other areas. In addition, the latter technique reduces the amount of information to be concentrated on in review.

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[4]Four responses did not seem to fit any category and were excluded from classification.

Table 5

Study Techniques Reported for Reading-to-Learn Tasks

Learning Strategy	Study Technique	Number	Total
Reread/Rehearse (R/R)	Reread/repeat	34	
	Memorize by repetition	7	
	Preview, then read	4	
	Copy verbatim in writing	2	
	Record on tape, listen to tape	1	
	Teach to someone	1	
			49 (34%)
Problem Solve/ Questions (P/Q)	Practice problems	21	
	Check problems against book	8	
	Take test/answer questions	7	
	Review questions/answers in text	6	
	Use study guides	1	
			43 (30%)
Relate/Associate (R/A)	Use pictures/diagrams and relate to text	15	
	Discuss with someone	4	
	Associate to other information	3	
	Listen to lecture	3	
	Use mnemonic device	2	
	Make drawings	2	
	Use other reference materials	1	
	Watch demonstration	1	
	Relate notes and book	1	
	Relate to previous work	1	
			33 (23%)
Focus Attention (F/A)	Take notes/study notes	12	
	Pick out key points	3	
	Use outline	1	
	Underline	1	
	Use study schedule	1	
			18 (13%)
			143 (100%)

Table 6

Use Frequency of Learning Strategies by
Navy Personnel (N = 144)

Strategy/Technique	Frequency		
	Almost Never	Occasionally	Frequently
Reread/Rehearse (R/R)			
Pre-scan material before studying	15	42	43
Try to memorize	28	26	46
Read material over	7	33	60
Problem Solve/Question (P/Q)			
Ask self questions	20	34	46
Relate/Associate (R/A)			
Draw pictures	38	36	26
Use dictionary	37	37	26
Focus Attention (F/A)			
Make outline	50	32	18
Underline important parts	18	25	57
Take notes	23	31	46

The "draw pictures" technique, within the R/A strategy, has previously been investigated by the Army (Sticht, 1975b) and the Air Force (Dansereau et al., 1975) as a method for improving comprehension and retention. Table 5 indicates that this technique, which requires considerable transformation of the text and elaborate encoding of what is comprehended, is used "almost never" by 38 percent of the sample and "frequently" by only 26 percent. It appears that this technique requires more effort than the R/R rereading technique or the F/A underlining technique.

Overall, the open-ended responses, which were obtained during the discussion of reading-to-learn tasks, revealed a much wider range of specific learning techniques than was included in the checklist. Nonetheless, there is considerable agreement that the R/R strategy, which requires the least transformation/elaboration, is the most frequently used strategy when learning is the major goal of the reading. This strategy may satisfy a "principle of least effort" requirement, since it requires little active reading of data. It is not known if this strategy is generally more or less effective than the others, although findings of previous studies (cf. Dansereau et al., 1974) suggest that the more active strategies tend to improve information retention.

Writing Component of Specific Job Reading Tasks

Respondents reported that, of the 325 job tasks identified, 197 (61%) required some type of writing. Of this total, 87 (44%) were cited by job performers; 79 (40%), by students; and 31 (16%), by instructors. Filling out forms accounted for 27 percent of this writing; and letters, memos, and log entries, 10 percent. For 124 (63%) of the 197 tasks, the writing consisted of "other" types such as (1) taking notes, (2) answering problems, questions, and tests, (3) completing job sheets and worksheets, and (4) making notations and corrections on sheets.

Overall, respondents had to show the writing to someone else for checking about half the time. However, as expected, students reported that they had to have their writing checked 62 percent of the time. The person most likely to check writing of job performers was a chief or officer; of instructors, a senior chief; and of students, instructors or teachers.

Literacy and Job Skills Training

Navy Training System

As indicated previously, the instructors and job performers were asked to rate the importance of certain training experiences in helping them to perform their present job, to pass the Navywide exam, and to perform a new job (at an advanced rate). The results are summarized in Table 7. As shown, daily job experience/OJT was cited by 100 percent of both groups as being important for performing their present job; further, it was cited by at least 97 percent as being important for passing the Navywide exam and for performing a new job. Self-study rating training was cited by 87 percent as being important for performing the present job; by 94 percent, for passing the Navy exam; and by 93 percent, for performing a new job. School rating training was cited by 89 percent as being important for performing the present job and passing the Navy exam and by 86 percent, for performing a new job. In contrast, prerating knowledge was cited by only 58 percent overall as being important for performing the present job; 45 percent, for passing the Navy exam; and by 43 percent, for performing a new job. No meaningful rating was received for off-duty education courses, since this category did not apply to over 75 percent of both groups.

As part of the same question, personnel were asked to indicate which of the four relevant training experiences they felt was the most important for providing information relevant to performing each of the three career activities. For performing the present job, job experience/OJT was cited by approximately 75 percent of both groups. For passing the Navy-wide exam, formal A school training was cited by 47 percent of the instructors and 28 percent of the job performers; and correspondence courses, by 30 and 48 percent. Responses in regard to performing future jobs were similar to those for performing current jobs, in that almost 70 percent of both groups chose job experience/OJT as being most important.

Table 7

Responses of Instructors and Job Performers Indicating Importance of Training Experiences to Navy Career Activities

Career Activity	Prerating Knowledge			School Rating Trng.			Self-study Rating Trng.			Daily Job Experience/OJT		
	Inst.	Job Perf.	Combined	Inst.	Job Perf.	Combined	Inst.	Job Perf.	Combined	Inst.	Job Perf.	Combined
Percent Indicating Training Experience had "Some Importance" or was "Very Important"												
Perform Present Job	48	62	58	90	88	89	94	84	87	100	100	100
Pass Navywide Exam	45	45	45	90	88	89	94	94	94	100	97	98
Perform New Job	46	42	43	93	82	86	97	90	93	97	97	97
Percent Indicating Training Experience which was "Most Important" for Specified Activity												
Perform Present Job	3	5	4	19	16	17	3	1	2	74	77	76
Pass Navywide Exam	3	2	1	47	28	34	30	48	42	20	23	22
Perform New Job	3	0	1	23	15	18	3	17	12	70	68	69

Thus, both groups indicated that, for career activities relating to actual job performance, job experience/OJT training was the most important of the training experiences. However, they differed in their evaluation of the importance of formal school training and the self-study course training in contributing to passing the Navy-wide exam, with the instructors rating the school training as most important. Instructor experience with school training may have affected their evaluation of its importance to the exam, particularly since the school text is frequently the same text as that used in the correspondence course.

Navy School Training

Overall, instructors and job performers reported that only 50 to 55 percent of the information taught in Navy school courses is relevant to performing a job. In contrast, they indicated that 70 to 75 percent of the information was needed to pass the course. The job performers also indicated that about 10 percent was not used for either purpose. In comparison, the students felt that 80 percent of the information taught was needed to satisfy course requirements. They also conjectured that about that same amount of information would be used later on the job. Thus, inexperienced students have fairly high expectations for applying what they are learning.

Responses received were also analyzed in terms of personnel in ratings grouped by job type (i.e., Service/Maintenance, Technical Maintenance/Repair, and Data). It was found that personnel in Service/Maintenance ratings felt that about 50 percent of what they learned in rating schools was relevant to their jobs; and personnel in Technical Maintenance/Repair and Data-oriented ratings, from 65 to 75 percent. These results indicate that, depending on the program, approximately 25 to 50 percent of the information taught is considered unnecessary in regard to performing Navy jobs. Thus, if training requirements could be brought more in line with job requirements, it appears that a considerable amount of time could be made available for job-related reading training and that training costs could be reduced.

A total of 159 suggestions for changes to the formal school training system was made by 112 personnel (about 75 percent of those responding to this question). Of this total, 35 (22%) were made by instructors; 53 (33%), by students; and 71 (45%), by job performers. The four categories of suggestions cited below accounted for 78 (49%) of the total:

1. Add more practical/simulated experiences to the training program (N = 27, 17%).

2. Lengthen the training time (N = 21, 13%).

3. Make the training more job-relevant (N = 18, 11%).

4. Provide more qualified and better instructors (N = 12, 8%).

Both Items 1 and 3 indicate a desire to make the training more relevant to job demands and to simulate OJT to a greater extent. This is consistent with the fact that OJT was reported as the most important training experience for improving job performance. Three additional suggestion

categories, accounting for 12 (7.5%) of the responses, further support the notion that school courses may contain much information of little relevance to the job. Those categories were: (1) include less theory, (2) eliminate unnecessary topics, and (3) cut down material to be learned. Thus, over one third of the suggestions for change indicated a desire for more job relevancy in training.

Estimates of the difficulty of the Navy's training language--both spoken and written--were made on a five-point scale with 1 indicating "very easy" and 5, "difficult." Results showed that over half of the instructors (62%) indicated that the school's spoken language was "very easy," contrasted with only 42 percent of the students and 34 percent of the job performers. None of the instructors preceived the spoken language as more difficult than average, while 5 percent of the students and 13 percent of the job performers did. Overall, over 90 percent of the personnel indicated that the school's spoken language was of average difficulty or easier.

In comparison, 34 percent of the instructors, 21 percent of the students, and 14 percent of the job performers felt that the school's printed language was "very easy," while 20 to 30 percent of the total personnel felt that it was of more than average difficulty. Eight-one (46% of the total sample) persons made a total of 107 suggestions for changes in the school's printed materials. Of this total, 21 (20%) were made by instructors; 40 (37%), by students, and 46 (43%) by job performers. The four categories of suggestions listed below accounted for 61 (57%) of the total:

1. Simplify the language of the material (N = 20, 19%).

2. Use better formatting and clearer writing style (N = 17, 16%).

3. Give more definitions; provide better glossaries (N = 15, 14%).

4. Provide more visual aids (e.g., diagrams) in the materials (N = 9, 8%).

Both Items 1 and 2 suggest that some people are having problems because of the reading difficulty of the material (as previously indicated). Also, two additional suggestion categories--get rid of extraneous information (N = 7, 8%) and reduce repetition (N = 3, 3%)--indicate that school materials might be reduced in volume.

Navy Rate Training Correspondence Courses

The estimates of the value of learning requirements imposed by rate training correspondence courses were similar to those of the value of school training. Instructors and job performers reported that, of the total information to be learned, only 50 percent was applicable to the job, while 70 to 80 percent was necessary to pass the Navy-wide exam. Ten to 15 percent of the material was reported as not relevant to either activity.

Responses received were also analyzed in terms of job performers distributed by rates (i.e., E-2s and E-3s, E-4s and E-5s, and E-6s and E-7s). Results showed that the amount of information judged as relevant to job performance increased as the rate increased. E-2 and E-3 personnel judged 35 percent of the material as relevant; E-4 and E-5 personnel, 45 percent; and E-6 and E-7 personnel, 62 percent. Overall, the personnel estimated that about 70 percent of the material was needed to pass the exam. Again, these data suggest that course/test requirements are more demanding than those for actual job performance.

In regard to the estimated difficulty level of rate training manuals, 22 percent of the instructors and 19 percent of the job performers felt that it was "very easy," and 25 and 16 percent, that it was of more than average difficulty. Students were not asked to respond to this question. When these results are considered together with those for formal school spoken and printed languages, it appears that personnel generally do not consider the training languages to be unduly difficult. However, one in four of the interviewees felt the printed training language was above average in difficulty.

Sixty-four persons (65% of the 99 who responded) made a total of 81 suggestions for changes to rate training materials. Of this total, 26 (32%) were made by instructors; and 55 (68%), by job performers. The four categories of suggestions listed below accounted for 60 (75%) of the total:

1. Use clearer format, and clearer language or writing (e.g., define terms and build interest into the materials (N = 24, 30%).

2. Provide more detail and more information in the manual (N = 16, 20%).

3. Include less detail; i.e., make the manuals more general (N = 13, 13%).

4. Design the materials to be more practical and rate-specific (N = 7, 9%).

Once again, the major category of recommended changes pertains to language and format. Items 2 and 4 should be considered together, since most of those asking for the more detailed information were job performers who wanted more information about their particular job. (It is interesting to note that items 2 and 3 contradict each other.)

Overall, there appears to be a desire for school and rate training correspondence courses to be modified such that they present less "nice-to-know" information and focus more on the information needed for job performance. There is also a desire to have written materials modified toward greater simplicity in format and language, with more attention directed to defining words as they are introduced.

Reading Problems/Reading Training

Extent of Reading Problems. Estimates provided by interviewees concerning the percentage of enlisted personnel with reading problems indicated that such problems were experienced by approximately 15 percent of personnel in recruit training (RT), 20 percent of students in Class A

schools, 20 percent of persons enrolled in rate training courses (RTC), and 15 percent of personnel performing on the job. As a group, the instructors tended to report more people as having reading problems than did either the job performers or students, particularly with regard to the RTC and on-the-job activities. Possibly, the instructors' experiences with school training and their attention on academic performance have focused their awareness on reading problems more than those personnel who are more concerned with doing a job.

In regard to their own reading ability, at least one fourth, overall, of the personnel interviewed indicated that they had "some" difficulty in understanding the materials used in the four career activities noted above. In fact, for both Class A and rate training courses, which place more academic requirements on the use of printed materials than the other two activities, the estimates rose to about 36 percent. Specific data pertaining to the four activities are provided below:

1. Recruit training. One hundred percent of the instructors and 95 percent of the students reported "no" reading problems in RT. However, only 62 percent of the job performers reported having "no" problems, while 35 percent reported having "some" problems; and 3 percent, "a lot." Overall, 73 percent of the personnel interviewed reported "no" reading problems in RT; and 23 percent, "some" problems.

2. Class A school training. Sixty-four percent of the instructors, 44 percent of the students, and 71 percent of the job performers reported "no" reading problems in Class A school. However, 52 percent of the students reported "some" problems, as compared to 27 and 26 percent for instructors and job performers. Overall, 64 percent of the personnel reported "no" reading problems in A school; and 32 percent, "some" problems. The differences between students and instructors/job performers indicated that personnel who are actively involved in a particular career activity are likely to report more problems than those who are recalling their training experiences.

3. Rate training correspondence courses. Twenty-seven percent of the instructors and 69 percent of the job performers reported having "no" difficulty in reading these materials; 64 and 28 percent respectively, "some" difficulty; and 9 and 3 percent, "a lot" of difficulty. Thus, overall, about one third of these personnel reported experiencing difficulty with the reading required in these courses.

4. On-the-job. Fifty-five percent of the instructors and 77 percent of the job performers reported having "no" difficulty understanding their job reading materials; and 45 and 22 percent respectively, "some" difficulty. Overall, 25 percent experienced "some" difficulty in understanding these materials.

When the same data in terms of personnel are distributed by GCT level, the relationship between aptitude and reading ability becomes obvious. For instance, of the personnel with a GCT of 45 or above (which corresponds to a reading ability above the 8th grade level (Duffy, 1976)), only 26 percent reported having difficulty with their printed materials in RT; 21 percent, in A school; 20 percent, in RTC; and 18 percent, on the job. Contrasted to

this are the results for those personnel with a GCT score below 45, which corresponds to a reading ability below the 8th grade level. Sixty-nine percent of these people reported reading problems in RT; 46 percent, in A school; 56 percent, in RTC; and 29 percent, on the job. This suggests that personnel with lower reading skills are likely to experience "some" or "a lot" of difficulty in understanding the materials used in the various career activities in which they will eventually participate.

Causes of Reading Problems. Low personnel skills were cited as the reason for reading problems by 73, 54, and 45 percent of the instructors, students, and job performers respectively; and a combination of low personnel skills and difficult materials, by 27, 36, and 45 percent. Overall, low personnel skills were cited as the cause by 52 percent of the personnel; and low skills/difficult materials, by 39 percent.

When asked why they felt personnel skills were too low or the materials were too hard, 127 (71% of the total sample) interviewees cited a total of 199 reasons--144 for people-related problems and 55 for material-related problems. Of the total responses, 28 (14%) were cited by instructors; 55 (28%), by students; and 116 (58%), by job performers.

The following five problem categories accounted for 107 (74%) of the 144 people-related problems cited:

1. People have never learned to read; they had a poor education (N = 53, 37%).

2. People don't try to read better; they skip over parts and/or ignore difficult parts (N = 17, 12%).

3. People ought to be able to read better than they do (N = 13, 9%).

4. People have low reading aptitudes; they are not able to read better (N = 12, 8%).

5. People don't want to read; they aren't motivated (N = 12, 8%).

Of these five reasons, only Item 4 seems to suggest a problem that might be inherent with the person and not modifiable to a great extent. Items 1 and 3 seem to be concerned with the person's lack of preparation, while Items 2 and 5 suggest problems of motivation. Thus, four out of five of these reported causes for reading problems appear to be amenable to modification through training and incentives.

The following four problem categories accounted for 50 (91%) of the 55 material-related problems cited:

1. The language used is too complex (N = 21, 38%).
2. The materials are poorly formatted (N = 12, 22%).
3. The materials are just "too hard" (N = 12, 22%).
4. There is too much material (N = 5, 9%).

Of these, Items 1 and 3 may be viewed as suggesting that personnel do not have the language skills required to deal with the material. These problems are thus amenable to solution by either literacy skill upgrading or by rewriting of materials. Items 2 and 4 seem to be more indicative of changes to materials than to personnel.

In summary, Navy personnel tend to attribute reading problems more to people and their lack of skill or motivation than to the inadequacies of training and job written materials. This suggests that further attention should be given to the provision of reading training for upgrading reading skills.

Attitudes Toward Reading Training. A total of 163 persons (92% of the total sample) provided 256 reasons for the low enrollment in volunteer reading training programs. Fifty-four (21%) of these reasons were cited by instructors; 100 (39%) by students; and 103 (40%), by job performers.

Overall, 32 percent of the responses indicated that the low enrollment was due to a lack of motivation (i.e., lack of interest or initiative) on the part of personnel. Another 18 percent indicated that personnel were perceived as being unwilling to admit a deficiency in reading skills by enrolling in a remedial course. Thus, half of the reasons given for why personnel do not attend the current reading training programs refer to emotional/motivational factors.

An additional 16 percent of the responses indicated that personnel felt there was no spare time available to take the course; and 7 percent; that people were unaware that such training was available. Only 10 percent of the overall responses suggested that people do not attend reading training courses because they feel they do not need such training.

Although the data given here are highly subject to bias toward socially acceptable answers on the part of respondents, they nonetheless provide an indication of the problems that need to be addressed when designing, developing, and operating a reading training program. For example, if reading training were integrated into job skills training motivation and initiative to succeed in job skills training could generalize to stimulate interest in developing better competence in performing job-related reading tasks. Also, personnel would not have to admit reading difficulties; they would simply proceed through a different course of job skills training (with intermixed reading training) than others. Finally, a job-related reading training program would be available during regular duty hours so that those without sufficient time for the current reading training, which is primarily given after-duty hours, could participate, and those who are not aware of the present reading programs would automatically become aware of the reading training being given in conjunction with job skills training.

Attitudes Toward Job-related Reading Training. Of the 178 personnel interviewed, 114 (64%) indicated that a job-related reading program would be helpful; 55 (31%), that it would not be helpful and 5 (3%), "maybe." Four (2%) did not respond. About half of those who said that such a program would not be helpful cited reasons for their positions; the majority of which (84%) indicated that respondents felt they did not need the training because they could "get by" without it.

When the same data were sorted over four levels of GCT scores (i.e., 44 or less, 45 to 54, 55 to 64, and 65 and over), a strong relationship emerged between a person's GCT score and his perception of the usefulness of a job-related reading program. Eighty-seven percent of personnel with a GCT score below 45 said that the program would be helpful to them, as compared to 68 percent of those in the 45 to 54 range; 60 percent in the 55 to 64 range; and 43 percent, in the range above 64. Thus, the lower the GCT score, the more likely a person will feel that a job-related reading program would be helpful to him in future career activities.

The same data were also analyzed in terms of ratings grouped by job ratings, which are the least demanding of the rating groups, said that the program would be useful to them, as compared to 68 percent of those in Technical Maintenance/Repair ratings and 64 percent of those in Data related ratings, the most demanding of the groups. The slight inverse relationship between rating aptitude requirements and personnel perceptions of the usefulness of a job-related reading training program (i.e., the more demanding the rating aptitude requirements, the less useful the training is perceived by personnel) indicates that the interview is obtaining valid responses.

Estimates of Enrollment for a Job-related Reading Program. Additional information obtained regarding the percentage of the interviewees who would actually sign up for a job-related reading training program if it were available during on-duty hours or off-duty hours provided some indication of the type of response (projected input) one might expect from the Navy in general for such a training program. As could be expected, results showed that 72 percent of the respondents indicated that they would be willing to enroll in the program if it were given during on-duty hours, as compared to only 43 percent for off-duty hours.

The same data sorted by the four levels of GCT scores noted above showed that 88 percent of job performers with a GCT score below 45 were willing to enroll in the program during duty hours, as compared to 74 percent of those with GCT scores in the 45 to 54 range; 65 percent, in the 55 to 64 range; and 60 percent, in the 65 or above category. A similar relationship, with lower percentages of personnel involved, was also found with the job performers volunteering to enroll in the program during off-duty hours: 56, 47, 30, and 20 percent respectively. Thus, personnel of lower GCT/reading skills reported more interest in enrolling in reading training than did more highly skilled personnel. This finding is consistent with the data presented above, which indicated that personnel with higher GCTs rated themselves higher in reading ability.

Information regarding incentives that would increase enrollment in a job-related reading program was sought from those who indicated they were not interested in either on or off-duty classes, plus a few "yes" respondents who qualified their responses, for a total of 61 persons. The following four response categories accounted for 35 (57%) of the total:

1. Direct order (N = 11, 18%).
2. Convince person he had a real need (N = 10, 16%).
3. Convince person course would be beneficial (N = 8, 13%).
4. Money (N = 6, 10%).

Self-estimated Reading Skill Levels. The foregoing indirectly indicates whether or not people feel that they are capable of dealing with the Navy's reading demands. A more direct estimate of the person's own reading ability was obtained by asking the interviewees to rate their reading ability in comparison to all other enlisted Navy personnel. The results showed that 14 percent of the interviewees ranked their reading skills in the upper 20 percent of all Navy enlisted personnel; 51 percent, above the 60th percentile; and 20 percent, at or below the 40th percentile. Thus, not all personnel perceived themselves as having well developed reading skills.

When the data obtained were analyzed in terms of GCT levels, a positive relationship emerged between a person's GCT score and his general reading ability, which is consistent with work done by Duffy (1976). For example, the job performers' judged reading level percentile scores were 45 for those with GCT scores below 45; 68, for scores between 45 and 54; 75, for scores between 55 and 64; and 80, for scores of 65 and above.

The fact that, overall, some 20 percent of the interviewees perceived themselves as having marginal reading skills (at or below the 40th percentile) is consistent with the finding that interviewees estimated that 15 to 20 percent of the Navy personnel have difficulty, to some extent, reading the Navy printed materials.

CONCLUSIONS

The results of the survey indicated that Navy personnel not only spend approximately a quarter of their day engaged in some job-related reading activity but also that between 10 and 20 percent of them have some type of reading skill deficiency. However, it was estimated that the reading difficulties were amenable to reading training. In fact, almost two-thirds of the interviewees indicated that a job-related reading training program could by very helpful to them for future career activities. These findings, while providing an indication of the scope and importance of the role of reading in the Navy, also reinforce the fact that reading as a problem area does indeed exist in the Navy.

The severity of this problem could be somewhat hidden by the fact that the repetitive nature of the typical job task may tolerate fairly low levels of literacy on the job; that is, it enables literate personnel to learn by rereading and repeated job performance. However, since this effect has a limiting influence on the person's career progression and utility for the Navy, it is not in the best interest of either party to ignore the deficiency and not try to remediate it in some manner. This is particularly true in light of the finding that, by bringing training requirements into line with job requirements, a considerable amount of time can be made available for job-related reading training and training costs can be reduced. This finding, coupled with the desirability of on-duty training appears to demonstrate the feasibility of developing an integrated job skills/reading skills training system that would permit the marginally skilled person to have a more satisfying career in the Navy, while simultaneously providing a more competent Navy force.

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